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Full Length Research Paper

Rural communities access to community and social development projects in North Central Nigeria

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This study on rural communities' access to community and social development projects in North Central Nigeria was carried out in North Central Nigeria. Multistage sampling technique and a sample size of 418 respondents was selected for the study. Data for the study were collected from primary sources. Primary data were collected through a well-structured questionnaire. 58.7% of the respondents were males whereas 41.3% were female. Descriptive statistics, such as frequency distribution, percentages and mean scores were used to analyze socioeconomic characteristic of the participants and access to CSDP project. Analysis of the educational qualification of respondents in the pooled results shows that majority of the respondents (43.3%) had Secondary School Certificates, (24.8%) had various Tertiary Certificates, while (19.5%) had Primary School Leaving Certificates, and (1.3%) had one form of formal education. This implies that about 88.9% of the respondents had formal education. It was also found that benefiting communities had high access to CSDP infrastructural provision and the respondents in the benefiting communities strongly agreed that the infrastructures provided by the CSDP had great effect in the various aspects of the community.

Key words: Rural, communities, access, social, development.

INTRODUCTION

A community can be described as all the people who live in a particular area (Hornby, 2004). It could be a group of people who have things in common because of their vocation, job, trade and even religion or sports. According to Nwizu (2001), a community is a group of people with socio-cultural, political or economic background who live together and do things together. The two distinct characteristics of a community are the physical/territorial boundaries with a certain uniqueness of separateness and social/cultural homogeneity depicting various communal behaviours and interacting relationship. Lemu (2006) defined community in the most simple and

comprehensive way as a collection of definable groups of people living together in one geographical location bound by a shared set of values, expectations, aspiration, identity and destiny, pursuing common political, social, economic and related goals in a context of collaboration, cooperation and team work irrespective of observable differences.

A rural community comprises a group of inhabitants who live a rustic or country lifestyle. Rural communities typically have smaller populations and an agricultural setting, but some areas contain forests. Any area that is not considered urban is rural. Countries and regions have

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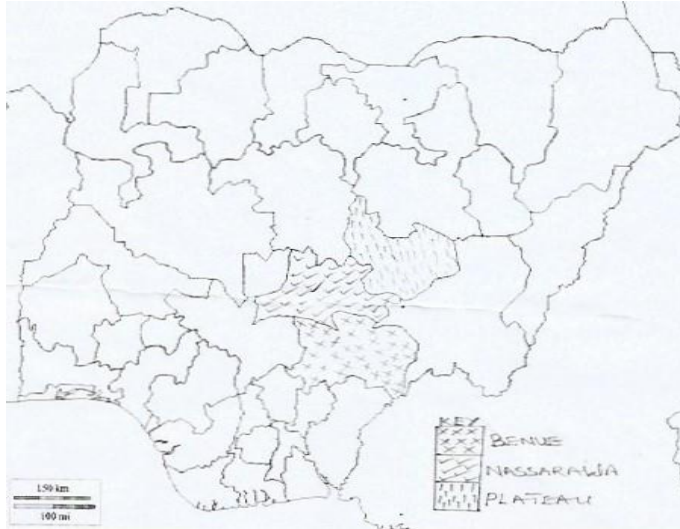


Figure 1. Map of Nigeria showing the study area with key indication.

different definitions of rural areas, and rural communities can define a region. The United States designates a rural area that has fewer than 2,500 residents in an open part of the country. The Organization for Economic Cooperation and Development of Canada defines a rural population as an area where over 50 percent of the population lives in a rural community. Other areas of Canada may have anywhere from 15 to 49% of inhabitants living in rural communities. Urban areas have fewer than 15% of a community dwelling in rural communities.

Community driven development focuses on empowering communities to exercise and claim their rights, and enable those responsible to fulfill their duties and community participation and empowerment are the keys to achieving this. These rights include civil and political rights (such as freedom of speech, political affiliation and assembly) as well as social, cultural and economic rights (such as access to land, shelter, education and health) (DFID, 2001). People accessing primary and secondary education as a result of Local EEMP activities had increased by 36.2% (Agbo, 2014) and there has been an improvement in educational sector in Benue State as a result of innovation and building of new school blocks in rural areas (Okopi, 2007).

Local Empowerment and Environmental Management Project (LEEMP) has been reported to build new health centres in most benefiting communities and renovated existing ones, as a result, a total of 1,013 males, 1,414 female and 1,010 children who would not have had access to health care services in their communities now do so (Doki, 2012). People accessing health clinic has increased from 380 to 850 showing an increment of 55 and 91.0% of the respondents agreed that there has

been an increase in number of people accessing health facility as a result of LEEMP intervention (Agbo, 2014). Community based organization and CSDP intervention impact significantly by the provision of micro-projects such as health centre (Agama, 2007; Ogenekohwo, 2014).

Access to health services is increased for the poor families in a community driven development project (Areand and Bassole, 2007) and there has been a reduction in the incidences of water borne diseases in the rural communities of Imo state (Nwaocha and Egejuru, 2010), this corroborated by Edmund and Nzirim (2009) who reported there was a considerable increase access (90%) to quantity of water supply relative to the total household needs after the execution of the project. Doki (2012) reported that before the intervention of LEEMP, the most common source of water were rivers, stream and hand dug wells and these water sources were located within an average distance of 4.3 km of the benefiting communities and they were also seasonal in nature being available in the rainy season and scarce in the dry season and the safety of the water was also not guaranteed as the source was accessible to animals and playing children.

Community based-organisation (CBO) has provided access to pipe borne water in rural communities and has reported that access to clean water increased for poor families in a community driven development program (Areand and Bassole, 2007).

In the transport sector, reported the number of community owned engine speed boats increased from 4 to 7 meaning a 42.8% increment (Agbo, 2014). This has led to increase in number of trips per month and there has been reduction in time taken per trip, the cost of water transport has also reduced by 28.5%, ease of transport and increase accesses of the beneficiaries, box culverts were also constructed. However, some of the box culverts were not well constructed in some of the communities ((Doki, 2012). The focus of this study is to evaluate rural communities access to community and social development projects in North Central Nigeria (Figure 1).

Statement of problems

In Nigeria, a lot of attention has been focused on rural transformation with a view to empowering the rural dwellers politically, socially and economically. Several government development programmes and policies have evolved over the years and were targeted at rural transformation. Despite all these developmental efforts, Bello (2007), reported that the North Central Nigeria is still generally under developed due to lack of modern infrastructural facilities such as pipe borne water, electricity, hospitals, all season roads, communication services, organized markets, among others. Therefore,

rural and agricultural underdevelopment looms in North Central Nigeria. This trend is worrisome and could probably be responsible for mass exodus of young people from the rural areas to urban areas. This study therefore was aimed at evaluating rural communities' access to community and social development projects in north central Nigeria.

METHODOLOGY

This study was carried out in North Central Nigeria. It lies between latitude 4°30N and 11°20N of the equator and longitude 3°E and 14°E of the Greenwich Meridian (FAO, 2004). The area occupies a land mass of about 296,898 Km² and a population of 21,566,993 million people (National population commission) (NPC, 2006). The population of this study consisted of all beneficiaries in North Central states in Nigeria. 418 respondents were selected for the study using multistage sampling technique. Primary data were collected through a well-structured questionnaire. Descriptive statistics, such as frequency distribution, percentages and mean scores were used to analyze socioeconomic characteristic of the participants and access to CSDP project.

RESULTS AND DISCUSSION

The results of the findings are as presented as follows:

Socioeconomic characteristics of the respondents

Sex

Table 1 shows that most (56.6%) of the respondent in Benue State were males and 43.3% were female, in Nasarawa most (56.1) were male and 43.9 percent were female while 67.3% were males and 32.7% were female in Plateau State. The pooled result shows that 58.7% of the respondents were males whereas 41.3% were female. This shows that both sexes were adequately represented in the CSDP projects with slight variation in favour of the male respondents. This could increase the level of involvement of the community members because most of the male member's household heads may have influence on participation of their members in the community projects. This is expected because males dominate most of the activities in most rural communities in Nigeria (Attah and Ejembi, 2015).

The pooled results in Table 2 show that 58.7% of the respondents were male whereas 41.3% were female. Similar results have been obtained by Mwangi and Kariuki (2015) who reported 57.8% and 42.2%, male and female respectively similarly, Okereke-Ejiogun et al. (2015) reported that majority of the respondents (68.1%) of the respondents as male while 31.9 female. This shows that both sexes were adequately represented in the CSDP project, with slight variation in favour of male respondents. This could be as a result of local customs that deny women participation in most social organization,

local customs that relegate women or forbid their participation in public activities can limit their contributions to community development, more so, some women in rural communities are not engaged in substantial income generating activities and may thus be discouraged from participating in community development projects that involve the payment of money.

Age

Data in Table 2 reveal that greater percentages (41.5%) of the respondents in Benue State were aged between 41 and 60 years, 39.0% were aged 21 to 40 years. Another 13% were above 60 years among others. Table 2 reveal that in Nasarawa state, a greater percentage (43.2%) were aged between 21 to 40 years, 36.2% were within the age bracket of 41 to 60 years. while 17.1% were above 60 years old. The majority (61.4%) of the respondents in Plateau were within the age bracket of 21 to 40 years, while 26.7% of the respondents were within the age bracket of 41 to 60 among others.

The pooled result revealed that about 44.2% fell within the age group of 21 to 40 years. This was followed by the 41 to 60 years age group, which represented 35.9% results of an average age of 38 years is lower than average age of 45 years reported by Othman (2006) on the impact of community Based Organizations on rural development. The mean age of 38 years in this result is also slightly lower than the 41 years which was reported by Oghenekohwo (2014) meaning that the men were in their productive age and women in their active reproductive years. This is a clear indication that they could handle the rigorous activities involved in community development work. Age is considered an important variable in rural community development because of its influence on people's attitude, skills and aspiration.

Marital status

A greater percentage (71.1%) of the respondents in Benue state was married, among others. Also, about 57% were married while 58.5% were married in Plateau state among others. These results are not unexpected because, marriage is considered important for matured individuals in the North Central.

The pooled result shows that majority of the respondents (60.5%) were married compared to 30.5% who were single and 9.0% who were divorced. This finding is similar to the findings of Mbam and Nwibo (2013) and Oghenekohwo (2014) who reported that 64.2 and 67.9% of the respondents respectively were married. This shows that most of the respondents who are married have greater responsibility, which may encourage them to be committed towards their participation in CSDP-Project, as the major beneficiaries of the projects.

Table 1. Distribution of respondents based on socio-economic characteristics.

Characteristics		Benue		Nasarawa		Plateau		North Central	
		F	%	F	%	F	%	F	Mean
Sex	Male	90	56.6	111	56.1	68	67.3	269	58.70
	Female	68	43.3	88	43.9	33	32.7	189	41.3
Age (years)	1-20	10	6.3	34	17.1	9	8.9	53	11.5
	21-40	62	39.0	86	43.2	62	61.4	210	45.7
	41-60	66	41.5	72	36.2	27	26.7	165	36.0
	>60	20	13.2	7	3.5	3	3.0	30	6.8
Marital status	Single	30	18.9	63	31.8	40	39.5	140	36.5
	Married	112	71.1	112	56.5	59	58.5	277	60.5
	Divorced	16	10.1	23	11.6	2	2.0	41	3.0
Educational attainment	Non-formal	20	12.7	29	14.6	10	9.9	59	12.9
	Primary	50	31.6	33	16.6	5	5.0	88	19.2
	Secondary	63	39.9	109	54.8	32	31.7	204	44.5
	Tertiary	25	15.8	28	14.1	54	53.5	107	23.4
		158		199		101		458	
Household size	1-5	59	37.7	97	48.7	39	38.6	195	42.6
	6-10	67	42.1	85	42.7	49	48.5	200	43.9
	11-15	27	17.0	12	6.0	11	10.9	50	10.9
	16-20	5	3.1	5	2.5	2	2.0	12	2.6
Major occupation	Farming	75	47.5	71	35.2	39	38.6	184	42.2
	Civil service	18	11.4	26	13.1	26	25.7	72	15.7
	Self employed	64	40.5	70	35.2	33	32.7	169	36.9
	Petty Trading	1	0.6	32	16.1	2	2.0	33	7.2

Primary occupation

Entries in Table 1 indicate that 47.2% of the respondents in Benue state had farming as a major occupation while 40% were self-employed among others. Similarly in Nasarawa state 35.2% were engaged in farming among others. In Plateau State, majority of the respondents (38.6%) were farmers, another 33.7% were self-employed, another 21.8% were civil servants, this was followed by 4.0% who had teaching as their profession, and the least was 2.0% who were engaged in petty trading. This result is similar to that of Okereke-Ejiogu et al. (2015) in their work on assessment of household participation in community and social development project in Imo state, Nigeria reported that majority (37.5%) of the respondents were into farming. The 40.3% reported in this study is slightly lower than that of Singh et al. (2015) who reported that more than (50%) of the respondents were farmers. These findings are supported by reports of Singh (2009), that agriculture is the predominant activity occurring in the rural communities and

considered the village economy. Similarly, Okere-Ejiogu et al. (2015) reported that farming is the predominant occupation in rural communities although people engaged in other activities.

Level of education

Entries in Table 1 indicate that 40.3% of the respondents in Benue State had secondary education, while 31.4% had primary education among others. In Nasarawa state, 53.1% had secondary education, followed by 17.2% who had primary education, 14.6% had tertiary education, while 12.5% had non-formal education among others. Similarly, in Plateau state 53.4% had tertiary education, 31.7% had secondary education, 6.9% had non-formal education among others.

Analysis of the educational qualification of respondents in the pooled results shows that majority of the respondents (43.3%) had Secondary School Certificates, (24.8%) had various Tertiary Certificates, while (19.5%)

Table 2. Mean and standard deviations responses of the level of access to CSDP Infrastructure (N=458).

Access to infrastructure	Benue State		Nassarawa State		Plateau State		North Central	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Lock up stores	2.00	0.01	4.00 ^x	1.41	2.56	1.11	2.61	1.14
Market structure	4.00 ^x	0.01	3.25 ^x	0.50	2.71	0.99	2.75	0.99
Water boreholes	2.33	0.88	3.54	0.54	2.72	0.95	2.90	0.95
Rural electrification	1.50	0.70	2.50	1.00	2.45	0.99	2.43	0.99
Erosion control	2.50	0.71	3.25 ^x	0.50	2.14	1.22	2.20	1.23
Construction of classroom	4.00 ^x	0.01	4.09 ^x	0.56	2.92	0.94	3.62 ^x	0.94
Community Farm Projects	2.00	0.02	3.00 ^x	0.89	2.48	1.14	2.50	0.13
Rehabilitation of rural roads	4.00 ^x	0.001	3.25 ^x	0.50	2.55	1.13	2.59	1.12
Construction of box culverts/bridges	4.20	0.891	3.53 ^x	0.59	2.37	1.19	3.37 ^x	1.26
Information technology centres	2.00	0.01	1.75	1.50	2.05	1.12	2.04	1.13
Health centres	4.86	0.535	2.75	1.26	2.75	1.06	3.45*	1.36
Provision of V.I.P toilets and incinerators	2.00	0.01	2.00	1.41	1.94	1.13	1.94	1.13

had Primary School Leaving Certificates, and (1.3%) had one form of formal education. This implies that about 88.9% of the respondents had formal education. This result is similar to that of Uoku (2012) who recorded that (82.1%) of the respondents had one form of formal education or the other. The result also corroborates that of Okereke-Ejiogu et al. (2015) who reported that majority (97.2%) of the respondents had one form of formal education or another. The acquisition of formal education will afford community members the opportunity to participate in developmental projects as educated people are more likely to access information from print and electronic media about projects that can add value to quality of living and poverty reduction.

Membership of social organization

Table 1 show that 58.5% were members of one form of association or the other in Benue State, while 41.5% did not belong to any association. A relatively high percentage (90%) was members of one form of association or the other in Nasarawa, while 10% of the respondents did not belong to any association. Also, in Plateau State, 53.4% belong to one form of association or the other, while 56.5% did not belong to any association. It could be said that majority of the respondents belonged to one form of organization or the other which can facilitate understanding of the program due to interaction among them. The pooled results shows that majority of the respondents (71.2%) belonged to one form of social organization or another whereas (28.8%) did not belong to any social organization. This result is similar to that of Okereke-Ejiogu et al. (2015) who reported that majority (91.2%) of respondents were members of social organizations. Membership of a social organisation offers members the opportunity to engage in collective action. Social organizations provide platforms

for collective identification of needs and pooling of resources to provide them.

Household size

Results in Table 1 show that 42.1% of the respondents in Benue state had a household size between 6 and 10 persons while 37.7% had a household size of 1 to 5 among others. In Nasarawa state, a greater percentage (48.7%) had a household size of 1 to 5 persons, 42.7% had household size of between 8 to 10 persons among others, furthermore, of the respondents in Plateau state most (48.5%) had a household size of 6 to 10 persons, 38.6% had a household size of between 1 and 6 persons, followed by 10.9% having a household size of 11 to 15 persons and 2.0% had a household size of 10 to 20 persons. The pooled results also showed that a greater percentage (43.8%) had a household size of 6 to 10. This result is similar to Agbo (2014) and Ajah and Ajah (2014) who reported an average household size of 8 persons in their various studies. The findings were also in agreement with that of Ayoola et al. (2011) and Alexander (2002) which reported that large household size characterize typical African societies with large blood relations. The large family size is justified in the role of increased hands on the farm in a manually or traditionally driven agricultural sector. Ejembi (2004) posited that a large household size enable such household to have sufficient workforce to enhance effective management of resources which invariably can guarantee steady income flow and consequently improve standard of living.

Annual income

Data in Table 1 show that in Benue state 20.1% had annual income of ₦100,000.00 to 200,000.00, while about 20% had annual income of ₦200,000 to 300,000

among others. In Nasarawa State, 34.7% had an annual income of greater than ₦500,000.00 while about 17% had ₦1000 to ₦100,000.00 among others. Entries in Table 1 indicate that a greater proportion (41.6%) of respondents in Plateau state had an average annual income of ₦1000 to 100,000 and 14.9% had annual income of ₦100,000. 00 to 200,000.00 among others. The pooled results shows 23.7% had an average of ₦500,000 .00 and above among others.

Level of access to CSDP infrastructure

Findings on perception of respondents on their access to infrastructural facilities provided by CSDP indicate that, in Benue State, average access to infrastructure perception index range from a minimum of low ($m=1.50$) for rural electrification, lock up stores, water borehole, community farm project, information technology, provision of VIP toilets and incinerators to very high ($m=4.86$) for health centre provision. Furthermore, respondents had moderate access to classroom block from CSDP. However, there was high access to CSDP market stalls ($m=4.00$), erosion control facilities ($m=4.00$), road rehabilitation by CSDP (4.00) and constructed box culvert/bridges ($m=4.21$). This result is similar to that of Adesida and Okunlola (2015) who reported low access for rural electrification ($m=1.50$), borehole ($m=2.03$), whereas they had classroom ($m=3.40$), bridges ($m=3.04$) erosion control ($m=3.38$) market stalls ($m=3.15$). The reason for high access for classroom, market stalls, etc, could be that they were based on the felt needs of the people and the communities provided counterpart funds, labour and materials for the project but borehole and rural electrification because of the technicalities involved were given out as contracts to experts.

Regarding access to CSDP projects in Plateau State, findings showed that average access perception index for CSDP infrastructural facilities range from low access to vip toilets incinerators ($m=1.93$), rural electricity ($m=2.44$), erosion control facilities ($m=2.14$) provided by CSDP and community farm project ($m=2.48$), to a moderate access to constructed classroom blocks ($m=2.92$), lock-up stores ($m=2.55$), market structure ($m=2.71$), water boreholes ($m=2.72$), rehabilitated roads ($m=2.55$) and health centres ($m=2.75$) constructed by CSDP. This implies that access to CSDP projects in Plateau State is not high. The result is similar to that of Adesida and Okunlola (2015) who reported low to moderate access to bridges, skill centres, classroom, borehole indicating that access to these projects were not significant.

In contrast to the situation in Plateau State, access index ranged from a minimum of low for information technology centre provision (1.75), constructed VIP toilets (2.00) to maximum of high access to constructed lock-up stores (4.00), constructed classroom blocks (4.09) and water boreholes (3.54). Respondents had moderate access to constructed market stalls (3.00), rural

electrification (2.50), erosion control facilities (3.25), community farm projects (3.00), rehabilitated road (3.25) and health centres (2.75) in Nasarawa State.

The analysis access perception index for pooled data indicates that respondents agreed that they had high access to classroom block (3.62) and health centre (3.45). This is because across the states, CSDP projects built more schools and rehabilitated existing ones. Construction of more schools blocks could improve the level of literacy in the area of study and subsequent economic development. Respondents had moderate access to lock up stores (2.75), market stores (2.75), water boreholes (2.90), rural electrification (2.43), community farm projects (2.50), and rehabilitation of rural roads (2.59), erosion control (2.20), and information technology centres (2.04). This could be because of the lack of electricity and literacy level in these communities. There was however low access to VIP toilets and incinerator (1.94) which means that these projects did not fall into the prioritized need of the communities and so were not executed in the communities. The result of one sample t-test indicates that CSDP made significant influence ($3.16 \leq t \leq 19.63$; $0.01 \leq P \leq 0.05$) on access to market stalls, water borehole provision, classroom block construction, culverts and bridge construction and health centers provision. However average perception of respondents on access to lockup stores, rural electricity, community farm project, road rehabilitation, erosion control, information technology, provision of VIP toilet was not significantly different from being low ($-4.485 \leq t \leq 1.48$)

The above finding agrees with that of Agbo (2014) who reported high access to primary and secondary education as well as health centres as a result of LEEMP intervention. This finding is further corroborated by Doki (2012) who reported that LEEMP and NAPEP programme enable high access to health centres and eased transportation. She, however, reported that some boxculverts were poorly constructed in some of the communities.

Similarly, Galadima (2009) reported that among the infrastructure provided by IFADC BARDP, school and health centre had high access. He however reported low access to box culverts. Oghenekohwo (2014) further reported that community based organization and CSDP intervention impact significantly on the provision of micro-project such as health centres. High access to infrastructure reported in this study agrees with the report of Akinwalare and Ajibola (2016) who reported that CSDP aligns with the World Bank commitment to poverty reduction, by permitting the rural poor of Nigeria to access improved social infrastructural and natural resources services.

Conclusion

The overall goal of CSDP is to improve access to services

for human development. As a project aimed at promoting development in rural areas, CSDP has fared well in the participating communities in North Central, Nigeria. It has brought about the undertaking of important projects in the communities by mobilizing community members for collective actions. This has increased the sense of social responsibility among the people while promoting social cohesion in the communities.

This study was designed to analyse the effects of CSDP projects on communities in North Central, Nigeria. It was found that benefiting communities had high access to CSDP infrastructural provision. Specifically, respondents' level of access to infrastructure provided by CSDP in the study area was high. As regards to the effects of CSDP infrastructural provision among the respondents in the study area, the respondents in the benefiting communities strongly agreed that the infrastructures provided by the CSDP had great effect in the various aspects on the beneficiaries. CSDP project staff ensuring transparency and accountability of project funds significantly increase the performance of the projects.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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Full Length Research Paper

Pre-scaling up of improved maize variety in Highlands and Midhighlands of West Guji Zone, Oromia National Regional State, Ethiopia

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This study was conducted at Bule Hora district of West Guji zone, Southern Oromia with the objective of further disseminating the already evaluated and selected variety maize, Jibat (AMH-851) to the farming community. The district was selected purposively based on potentiality and accessibility for maize production; and two potential peasant associations (PAs), Hera Liphitu and MetiTokuma were selected. A total of 20 trial farmers, 10 from each PAs were selected. Subsequently, 86 farmers were trained by multidisiplinary team of Yabello Pastoral and Dryland Agriculture researchers (Breeder, Agronomist, Economist and Extensionist) on importance of maize production, agronomic practices and pre and post-harvest management of this variety. One variety of maize, Jibat was planted on 0.25 ha on each 20 farmers' fields. A seed rate of 25 kg/ha and 100 diammonium phosphate (DAP) kg/ha were used with a line spacing of 75 and 25 cm between plants and rows, respectively. Accordingly, in the course of implementation, a total of 20 farmers were reached, 125 kg seed was delivered and an area of 5 ha was covered. Field day was organized in representative potential PAs on which a total of 113 participants (80 farmers from trial and non-trial, 3 researcher, 18 development agents (Das) and 12 stakeholders including GOs and NGOs) attended to share experience, evaluate the performance and to communicate the progress of the activity. The overall grain yield performances of Jibat variety was 4.1 tons/ha⁻² on farmers' field. The research intervention had contributed to improve food security, livelihood and knowledge and skill of trial farmers. Upon completion of the activity an exit strategy was designed and respective district office of agriculture and natural resources were officially invited to discuss its sustainability. Based on this study, it is evidently clear that the Jibat maize variety should be scaled up in the farming community to improve livelihood.

Key words: Pre-scaling up, multidisiplinary, Jibat, BuleHora.

INTRODUCTION

Maize is originated in Central America and was introduced to West Africa in the early 1500s by the

Portuguese traders. It was introduced to Ethiopia during the 1960s to 1970s. Today, maize is one of the most

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important food crops worldwide. It is grown in most part of the world over a wide range of environmental condition, ranging between 50° latitude north and south of equator. It also grows from sea level to over 3000 m above sea level (MoANR, 2017).

In Ethiopia, maize grows from moisture stress areas to high rainfall areas and from lowlands to the highlands. It is largely produced in Western, Central, Southern and Eastern parts of the country. In 2017 cropping season, 2,135,571.85 ha of land was covered by maize with an estimated production of 784.7 tons (CSA, 2017).

In Ethiopia, maize is produced mainly for food, especially in major maize producing regions particularly for low income groups; it is also used as staple food. Maize is consumed as “Injera,” porridge, bread and “Nefro.” It is also consumed roasted or boiled as vegetables at green stage. In additions to the aforementioned, it is used to prepare local alcoholic drinks known as “Tella” and “Arekie.” The leaf and stalk are used for animal feed and also dried stalk and cob are used for fuel. It is also used as industrial raw materials for oil and glucose production (MoANR, 2017).

Maize is the dominant cereal crop grown in Bule-hora district of West Guji zone. In 2005 and 2006 cropping season, the Yabello Pastoral and Dryland Agriculture Research Center (YPDARC) has carried out demonstration of the newly improved maize (Jibat) variety to the selected trial/participated farmers for two consecutive years (2013-2014). The results of demonstration have shown that Jibat variety was found to be early mature and high yielder variety (4.4 tons/ha) compared to local standard check which yields only 2 tons/ha (Ahimad et al., 2014). However, there is no study carried out so far in the district to further popularize and pre-scale up of Jibat maize variety in the study area. Therefore, this study was initiated to further promote and pre-scale up of this variety in the selected peasant associations (PAs) of BuleHora district.

Objective

The general objective of the study was to increase the production and productivity of maize in the study area. The specific objectives of the study were:

- (1) To increase production and productivity of participant small scale farmers in the study area.
- (2) To improve farmers’ knowledge and skill of application of the improved maize technology
- (3) To develop local capacity for future scaling up of maize technology
- (4) To strengthen stakeholders linkage and collaboration

METHODOLOGY

Description of the study area

Bule Hora is found in southern Ethiopian rift valley 467 km away

from Addis Ababa. It is located at 8° 16 ‘N Latitude and 28° 8 ‘E Longitude and has an altitude ranging from 1300 to 2600 masl. Currently, the district has 43 peasant association and 5 Urban kebele of which 31 of them are under “woynadega”, 5 of them are under “Dega” and 12 of them are under “kola” agro ecology. It has two major rainy seasons namely Arfasa, which begins from March and ends on May and Ganna in which only a few cereal crops are grown beginning from September and ending in November. Arfasa is the major cropping season especially for cultivation of field crops. The average annual rain fall of the district ranges from 800 to 1500 mm and the average annual temperature from 15 to 30°C. It is bordered by Dugdadawa in the south, Malka Soda in the east, Karcha in the north and SNNP in the western direction. The woreda’s economic base is agriculture and this includes cash crop and field crop production and animal rearing. The major crops produced in the woreda are maize (*Zea mays*), Teff (*Eragrostis abyssinica*), haricoat bean (*Phaseolus vulgaris*), inset, sweet potato (*Lopmoea batatas*), and chat. According to the soil map of Ethiopia (National Atlas), the district has three dominantly occurring soil types. The first two are orthic acrisols, which cover about 65% and orthic luvisols 15% of the total area of the district, while calcaric and eutric fluvisols cover about 10% of the area of the district. Dystric nitosols and chromic eutric and cambisols cover about 10% (each 5%) of the total area of the district (BHFEDO, 2017).

Site and farmers selection

The activity was carried out in Bule-hora district of West Guji Zone. Two potential maize producing PAs and 10 farmers from each PAs were selected with the collaboration of district Agricultural Offices. One improved variety, namely, Jibat was used for this activity. A 2500 m² (0.25 ha) of land was used for this activity at each selected farmers’ field. Training was organized for the selected farmers and respective Development Agents. Close supervision and monitoring was undertaken through joint action of stakeholders.

Memorandum of understanding

Prior to the beginning of the activity, memorandum of understanding (MoU) was signed between Yabello Pastoral and Dryland Agriculture Research Center (YPDARC) and Bule Hora district Agricultural and Natural Resource office on their responsibility to ensure sustainable dissemination of the technology for a wider community. Close supervision and monitoring was undertaken through joint action of stakeholders.

Mechanisms/Approaches used and procedures followed to enhance technology dissemination

Research design

One variety of maize, Jibat was planted on plot size of 0.25 ha (50 m × 50 m) of land on each 20 farmer’s fields for this activity. A seed rate of 25 kg/ha and 100 kg diammonium phosphate (DAP/ha) was used with a line spacing of 75 and 25 cm between plants and rows, respectively. Accordingly, a total of 20 farmers were reached, 125 kg seed was delivered and an area of 5 ha was covered.

Data collection

Appropriate data collection methods (simple survey assessment, preparing checklists, personal observation, field days, five point Likert scale) were employed to collect both qualitative and quantitative data. The types of data collected included yield data,

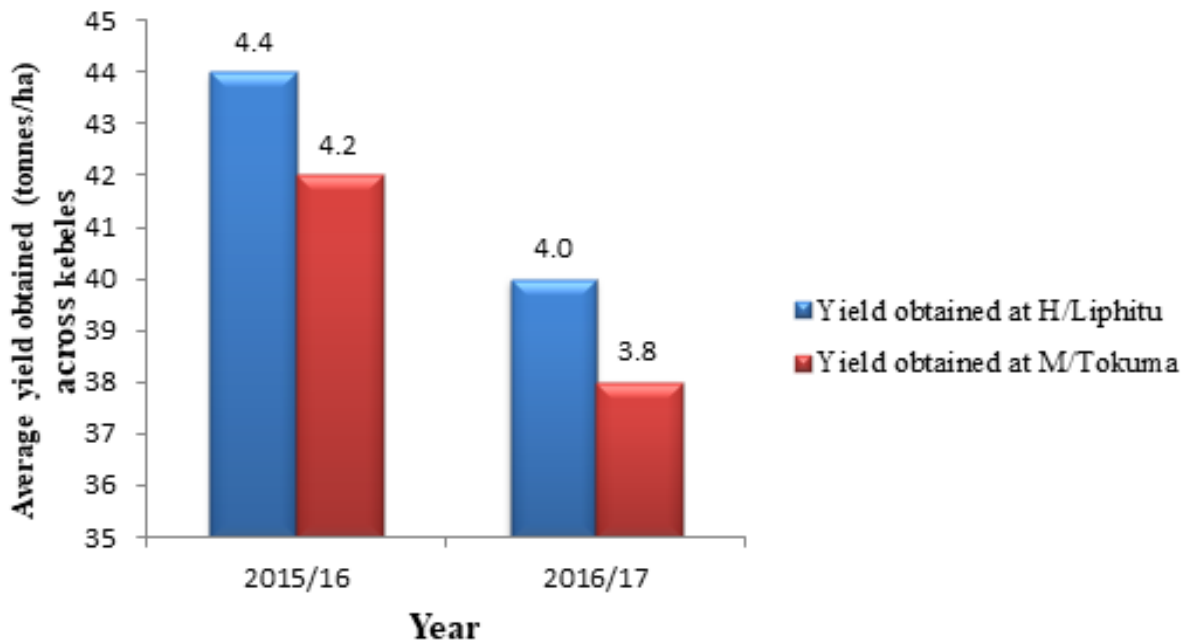


Figure 1. Yield performance of pre-scaled up of Jibat variety on selected farmers' field across district and years.

change in level of knowledge and skill of farmers and/or agro pastoralists, total number of farmers participated on extension events such as training, field visits and field days, total number of farmers adopting the technology/innovation and stakeholder's participation.

Data analysis

Farmer's preference was analysed qualitatively through narration and description and economic and agronomic data were analysed by descriptive statistics using SPSS version 20.

Method of analysis of change in level of farmers' knowledge and skill

The investigation of the immediate application of new knowledge is very important to know whether the knowledge of a particular farmer was improved after engaging in it or not. Seba et al. (2012) and Lin and Lee (2004) developed a questionnaire based survey and measured perception and knowledge using five point Likert attitude scale. For the purpose of this study, about 8 statements/items which are used as a proxy indicators of knowledge such as change in the level of knowledge and skill on application of appropriate seed rate, distance between rows and plants, sowing, weeding and other management practices, seed preference, importance of technology and changes in knowledge and skill made by the trial farmers pre and postharvest management were developed. The knowledge level and skill of the respondents were scored before and after participating in pre-scaling up of improved maize (Jibat) variety. The score was calculated by giving values to all responses used as a proxy of indicator of the level of knowledge and skill following five point Likert type attitude scale (5= Strongly agree, 4= Agree, 3= undecided 2= Disagree, 1= Strongly disagree). The total knowledge score for the participant was used to represent total score. This was used for analysis of paired sample t-test to check whether knowledge of

farmers has improved or not.

RESULTS AND DISCUSSION

Total production and productivity per unit area

The pre-scaling up of improved maize variety (Jibat AMH-851) was undertaken for two consecutive years in two PAs or kebeles of BuleHora district of West Guji Zone in the 2015/2016 and 2016/2017 cropping seasons. The variety was treated with full recommended maize production and management practices. Yabello Pastoral and Dry Agriculture Research Center was the source of all inputs (seed, fertilizer and herbicides). The result of the study revealed that the average yield of improved Jibat variety obtained in 2015/2016 cropping season was 4.4 and 4.2 tons/ha while that of 2016/2017 cropping season was 4.0 and 3.8 tons/ha at Hera Liphitu and MetiTokuma, respectively (Figure 1). Generally, the overall average grain yield of Jibat maize variety was 4.1 tons/ha. The yield obtained in 2016/2017 was lower compared to that of 2015/2016 cropping season due to erratic rainfall conditions. In spite of this, the production and productivity of maize of the trial/participated farmers has increased in the study area as compared to local maize varieties because of its early maturity and high yielder. The average yield of pre-scaled up of Jibat maize variety was almost 1.5 times higher compared to the average zonal productivity of local maize variety which was 2.7 tons/ha (CSA, 2017). The study indicates that the financial base of farmers involved in the studies has

been broadened.

Training of farmers/agro pastoralists and stakeholders

Participatory training consisting of theoretical and practical session was given by multidisciplinary team of Yabello Pastoral and Dryland Agriculture researchers (Breeder, Agronomist, Economist and Extensionist) in the selected district of BuleHora, West Guji Zone at Hera Liphitu and MetiTokuma PAs. A total of 85 participants: 67 farmers/pastoralists and 18 development agents/subject matter specialists participated on training (Table 1). The subjects of the training included the production and management practices, diseases and pest control, fertilizer application, appropriate amount of seed rate, distance between rows and plants and creating strong linkage among relevant stakeholders through multi-stakeholders approach to mitigate the problems in joint action taking immediate, short and long term measures.

Field day

At physiological maturity stage of the improved maize variety (Jibat), a mini field day was jointly organized with other relevant stakeholders such as zone and districts level agricultural development offices and participated farmers/agro pastoralists in the district to create awareness about the importance of using improved maize variety and its agronomic and management practices and boosting the dissemination of the varieties through farmers to farmers. A total of 113 participants (80 farmers from trial and non-trial, 18 development agents, 3 researchers and 12 relevant stakeholders including Government Organizations and Non-Government Organizations participated in the mini field day. The participants shared their experience and discussed the condition of improved variety with trial farmers and identified the criteria such as grain yield, early maturity, suitability for Injera and bread, market demand and resistance to diseases and pests. Based on the criteria, Jibat maize variety was selected for further scaling-up in the district (Table 2).

Change in level of knowledge and skills of participating farmers

Farmers' knowledge and skills are expected to be improved after engaging in pre-scaling up of improved varieties because of practical and theoretical training given for them on all aspects of production in relation to sowing, weeding, pest control, importance of technology, etc. The highest attitude score for knowledge and skill improvement before and after engaging in pre-scaling of

improved maize variety was 23 and 34, respectively, whilst the lowest attitude score for knowledge and skills improvement was 13 and 27, respectively (Table 3). The mean attitude score of knowledge and skills for before and after engaging in pre-scaling up of improved variety was 16.6 and 31.8, respectively, out of a potential score of 40. The result of paired sample t-test revealed that there is positive and a statistically significant mean difference ($p= 0.01$). The implication is that farmers' knowledge and skills have improved after engaging in pre-scaling up of improved maize variety.

Memorandum of understanding

Prior to the beginning of the activity, memorandum of understanding (MoU) was signed between Yabello Pastoral and Dryland Agriculture Research Center (YPDARC) and Bule Hora district Agricultural and Natural Resource office on their responsibility to ensure sustainable dissemination of the technology for a wider community. Accordingly, a strong linkage was enhanced/made among relevant stakeholders from the start to exit strategy of pre-scaling up of this variety through working collaboratively; jointly monitoring and evaluation, attending extension events such training, organizing, field visit and field days. In doing so, the local capacity for future scaling up of maize technology was developed and stakeholders' linkage and collaboration strengthened.

Exit strategy

The mandate of Yabello Pastoral and Dryland Agriculture Research Centre (YPDARC) is starting from adaptation/generation to demonstration and up to pre-scaling up stage of appropriate technologies needed for sustainable development of pastoral and agro-pastoral areas of the zone in particular and Ethiopia in general. Thus, it is important to look for an alternate option in which large number of farmers can involve in the technology promotion through strategic mechanisms. For this case, the main collaborator of YPDARC was office of Bule Hora Agricultural and Natural Resource of the district in the study area. Therefore, the wider scope of further dissemination of the technology should have remained to be implemented by respective office of Agricultural and Natural Resource district in the study area. This is to keep that the extension system linkage among that organization and to relay the continuity of technology for a wider coverage until the better new technology option developed. To achieve this goal, YPDARC and the respective districts office of Agricultural and Natural Resource have discussed on how to keep the sustainability of disseminating and wider scaling up of the technology to larger people and then agreed to own the

Table 1. Training of Farmers and other Stakeholders on maize production.

Year	Participants (N=85)						Grand total
	Experts (DA+SMS)			Farmers			
	Male	Female	Total	Male	Female	Total	
2015/2016	8	3	11	39	6	45	56
2016/2017	3	4	7	20	2	22	29
Total	11	7	18	59	8	67	85

N: Implies number, DA: development agents, SMS: subject matter specialists.

Table 2. Mini field day organized on maize production.

Year	Technology		Number of participants						Total
	Visited during field day	Location/district	Farmers/Pastoralists			Researchers	DAs	Stakeholders (GOs and NGOs)	
			Male	Female	Total				
2015/2016	Maize (Jibat)	BuleHora(H/Liphitu)	65	15	80	3	18	12	113

DA: Development agent, GO: government organization, NGOs: non-government organization.

Table 3. Change in level of knowledge and skills of farmers' on application of improved maize variety.

Variable	Farmers' knowledge and skill improvement (N=20)			t-value
	Before scaling up		After scaling up	
Mean	16.6		31.8	23.337***
Std. Deviation	2.5		1.6	-
Minimum	13		27	-
Maximum	23		34	-

N: Number of participants, ***Indicates 1% level of significance.

technology by office of Agricultural and Natural Resource of the respective districts and with the facilitation of YPDARC in technical and close supervision.

CONCLUSION AND RECOMMENDATIONS

In Ethiopia, is impossible to increase the production and productivity, insure food security and improve the livelihoods of farmers, pastoralists and agro pastoralists where conventional farming is dominant without the use improved varieties with best management practices. Thus, much is expected from stakeholders to increase the production and productivity of small scale farmers. Recognizing this, YPDARC has conducted the pre-scaling up of improved maize at BuleHora district for the two consecutive years. Generally, the result of this study revealed that improved Jibat maize variety gave higher yield, with increased income thus, leading to improvement in the standard of living in the district where the pre-scaling up study was conducted.

Participatory training consisting of theoretical and

practical sessions was given for selected farmers on the production, pre and post-harvest management of maize variety. Accordingly, many farmers built their awareness on the quality of newly introduced Jibat variety and understood that it can give a reliable yield and improve their production and productivity which in turn will improve their livelihoods and ensure food security. Moreover, knowledge and skill of Development Agent (DAs) and agricultural experts were also improved through training and exchange visits.

Better accessing of Jibat variety, improving farmers' skill, knowledge and attitude of the trial farmers on the importance and application of all recommended packages were the impacts attained during the pre-scaling up activity. Furthermore, popularization and pre-scaling up of improved Jibat variety enhanced through farmer to farmer seed dissemination mechanism.

Memorandum of understanding was signed between Yabello Pastoral and Dryland Agriculture Research Center (YPDARC) and West Guji zone Agricultural and Natural Resource office on their responsibility to ensure sustainable dissemination of the technology for a wider

community. In doing so, strong linkage among relevant stakeholders was made for the sustainability and ensuring further scaling up/out of the technology in the similar agro-ecologies. Finally, upon completion of the study, an exit strategy was designed and district office of agriculture and natural resources were officially invited and handed over ceremony was made to ensure its sustainability.

RECOMMENDATIONS

Based on the findings of this study, the following recommendations are made.

Stakeholders should give due attention on enhancing farmers' capacity building (knowledge and skill) through training, strengthening linkage among all relevant stakeholders, widely extending scaling-up/out of improved Jibat maize variety in the study areas and districts with similar agro ecology in the zone for a wider community at large. This will increase production and productivity of maize in the study area in particular and West Guji Zone in general.

There should be strong linkage among relevant stakeholders: farmers, agro pastoralists, research centers, zonal and district agricultural offices so as to build the capacity for future sustainable dissemination of the maize technology for a wider community at large in the study area in particular and other similar agro ecology in general.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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